Original Article

Pattern and distribution of pedestrian injuries in fatal road traffic accidental cases in Dharan, Nepal

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Abstract

Background and Objectives: Road traffic injuries are one of the leading causes of death in the world. The present study aims at evaluation of pattern and distribution of injuries among pedestrians thereby planning successful measures to minimize fatalities. **Materials and Methods:** The present study was conducted in the Department of Forensic Medicine and Toxicology, B.P. Koirala Institute of Health Sciences, Dharan, Nepal. This study included 50 cases of pedestrian victims of fatal road traffic accident, brought for medico-legal postmortem examination. **Results:** Highest number (17 or 21.3%) of fatalities occurred in the 41-50 years age group followed by the age group 31-40 years (15 or 18.7%). Male victims outnumbered female resulting in male to female ratio of 1.8:1. Most of the pedestrians were illiterate (26 or 32.5%) followed by those who were educated up to primary school (14 or 17.5%). Nearly half of the cases (38 or 47.5%), four or more wheelers – heavy vehicles – were involved. Fracture was the most common type of injuries (55 or 28.9%) followed by laceration (50 or 26.3%). In 44 (55%) cases, primary impact injuries were noted, secondary impact injuries in 55 (68.7%) cases, and secondary injuries in 62 (77.5%) cases. More than one-fourth (22 or 27.5%) of the deaths were due to pelvic and extremities injuries. **Conclusion:** Pedestrians, people who travel by foot, wheelchair, stroller, or similar means, are most vulnerable users of the road. Before head out on foot for a stroll, power walk, or errand, there are important safety tips to remember. A greater awareness about traffic rules will go a long way in curbing the incidence of fatal pedestrian accidents.

Key words: Epidemiology, injury, pedestrian, road traffic accident, victim

INTRODUCTION

Of all the systems that people have to deal with on a daily basis, road transport is the most complex and the most dangerous. These days' road traffic injuries are one of the leading causes of death in the world.[1] Using epidemiological evidence from national studies, a conservative estimate can be obtained of the ratios between road deaths, injuries requiring hospital treatment, and minor injuries, as being 1:15:70 in most countries.[2-6] In many low-income and middle-income countries, the burden of traffic-related injuries is such that they represent between 30% and 86% of all trauma admissions.[7,8] While a decrease in deaths due to road traffic crashes of some 30% is forecast in high-income countries, current and projected trends in low-income and middle-income countries foreshadow a huge escalation in global road crash mortality between 2000 and 2020.[9]

With drastic increase in number of vehicle registered in the area along with the population with each passing year causing an increase in fatalities in road traffic accident. In Nepal alone, accidents account for the highest fatality rate reaching to almost peak of 15-20 times than that of developed nations. The roadside accidents have acquired an epidemic proportion and are putting an extra burden on our health resources.[10,11] Moreover, in a country like ours, with poor roads, ill maintained vehicles, improper rash and negligent driving, intake of intoxicants (alcohol/drugs) by driver/victims, highway being used as the sites for play of children and poor sense of traffic rules in public including drivers, etc., leads to increased involvement of people in road traffic accident.

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The present study has been planned to carry out regarding the pattern and distribution of injuries among pedestrians thereby plan successful measures to minimize fatalities and disabilities.

MATERIALS AND METHODS

This study included 75 cases of pedestrian in fatal road traffic accidents brought to B.P. Koirala Institute of Health Sciences, Dharan for medico-legal postmortem examination, details of which had been recorded. The cases were brought directly from the site of accident or who died after admission following road traffic accidents. The relevant information was collected from:

- The inquest report and other relevant papers brought by the police
- Interviewing the police personnel accompanying the dead
- Interviewing the relatives, neighbors, friends, or persons accompanying the deceased.

The data thus collected was analyzed statistically.

RESULTS AND DISCUSSION

With exploding population, increasing registration of automobiles every month, rampant encroachment of roads, nasty tendency of violating traffic rules, and chaotic traffic systems have greatly contributed rapid strides in road traffic accidents. Every day as many as 140,000 people are injured on the world's roads. More than 3000 die and some 15,000 are disabled for life. Each of those people has a network of family, friends, neighbors, colleagues, or classmates who are also affected, emotionally and otherwise. Families' struggle with poverty when they lose a breadwinner or have the added expense of caring for disabled family members.[12]

An accident is a result of defects in the host (victim or road), agent (vehicle), and environment (road condition and social atmosphere) or a combination of the defects in all three factors. The human factor has been reported in the literature as being the most prevalent contributing factor of road traffic crashes.[13-15] Thus road user is of greatest medical concern, in attempts to control accidents.[16]

In the present study [Table 1], the age of the victims varied from 6 to 67 years. Highest number (17 or 21.3%) of fatalities occurred in 41-50 years age group followed by the age group 31-40 years (15 or 18.7%), 21-30 years and >50 years (14 or 17.5% each), 11-20 years (12 or 15%), and <10 years (8 or 10%). Nearly three-fourth of the victims were males (52 or 65%) while the females constituted only 28 (35%) cases resulting in male to female ratio of 1.8:1. Study conducted by Singh *et al.* showed that the number of male victims were more than the seven-eighth of the total cases, giving the ratio of male:female = 7:1.[17] Menon and Nagesh showed that males comprised 89% and females 11% of the total victims.[18] Chavali *et al.*[19] and Sharma *et al.*[20] found male:female ratio being 5:1. In Nepali society, though trying to give equal importance to both genders, is still a male-dominated one with the male members lead a more active life and keep themselves most of the time outdoors to earn bread and butter for families. Though females mostly keep themselves indoor doing household work, due to lack of industries and low potential for employment rate owing to poor literacy, they have to move to jungle to collect woods, farm for cultivation, and with domestic animals to feed.

Highest number of pedestrians in present study [Table 2] were illiterate (26 or 32.5%) followed by those who were educated up to primary school (14 or 17.5%), middle school (12 or 15%), nonschool going kid and high school (8 or 10% each), intermediate and graduate (4 or 5% each). This gives the indication that lack of road traffic senses resulting either from illiteracy or poor literacy may have been a significant contributory factor to the causation of fatal road traffic accidents.

In our present study [Table 3], four or more wheelers – heavy vehicles involved in the maximum (38 or 47.5%) cases followed by (38 or 47.5%) followed by four or more wheelers – light (22 or 272.5%) and motorbike (20 or 25%). In low-income countries, where the majority of pedestrian impacts are with buses and cars, one hospital-based study

Table 1: Age and sex of the victims

Age of the victim	Male		Female		Total	
	No.	Percentage	No.	Percentage	No.	Percentage
<10 years	5	6.3	3	3.7	8	10
11-20 years	7	8.7	5	6.3	12	15
21-30 years	10	12.5	4	5	14	17.5
31-40 years	11	13.7	4	5	15	18.7
41-50 years	9	11.3	8	10	17	21.3
>50 years	10	12.5	4	5	14	17.5
Total	52	65	28	35	80	100

in New Delhi by Varghese found that 16% of injured pedestrians had been struck by motorized two-wheelers.[21] Crandall *et al.* found that crashes between vehicles and pedestrians are responsible for more than a third of all traffic-related deaths and injuries worldwide.[22]

Table 4 shows majority (55 or 28.9%) of the injuries sustained in the victims were fracture followed by laceration (50 or 26.3%), abrasion (44 or 23.2%), and contusion (41 or 21.6%). According to the study by Singh and Dhattarwal, fractures/dislocation and lacerations were most commonly seen in 89.1% and 88.8% cases followed by abrasions (84.4%).[23] Fractures constituted largest percentage of all injuries due to heavy impact from vehicles and also from a fall.

As far as the distribution of impact injuries is concerned [Table 5], impact injuries were noted in 44 (55%) cases, secondary impact injuries in 55 (68.7%) cases, and secondary injuries in 62 (77.5%) cases. Since a single accident may lead to multiple primary impacts, in the present study [Table 5] out of 44 cases of primary impacts a total of 61 primary impact injuries have been recorded. Maximum injuries recorded in lower extremities (21 or 34.5%) followed by thorax (10 or 16.4%), pelvis (9 or 14.7%), upper extremities (8 or 13.1%), buttocks (7 or 11.5%), head and neck (2 or 3.3%), and abdomen (1 or 1.6%). In contrast, maximum secondary impact injuries found in head and neck (21 or 27.6%) followed by lower extremities (19 or 25%), upper extremities (16 or 21.1%), whereas in pelvis, thorax, abdomen, back, and buttocks there were least involvement of injuries. Out of 98 secondary injuries, maximum injuries were recorded in lower extremities (25 or 25.5%) followed by head and neck (23 or 23.4%), back and upper extremities (15 or 15.3% each), buttocks (9 or 9.2%), pelvis (6 or 6.1%), thorax (3 or 3.1%), and abdomen (2 or 2.1%).

In this series [Table 6], majorities (22 or 27.5%) of the victims died due to pelvic injuries and injuries to the extremities followed by head injury alone (10 or 12.5%), combination of head–thoracic injuries and head–thoracic–abdominal injuries (12 or 15% each), head–abdominal and thoracic–abdominal (8 or 10% each), thoracic injuries alone (6 or 7.5%), and abdominal injuries alone (2 or 2.5%).

PREVENTIVE MEASURES

Walking is good for your health, and it is good for the environment too. Unfortunately, in traffic incidents involving pedestrians and vehicles, it is the pedestrian who suffers, often with tragic results. In many cases it is not the driver's fault. It is the responsibility of both driver and pedestrian to ensure each other's safety by following some simple rules.

Table 2: Educational status of the victims

Educational status	Number	Percentage
Nonschool going kid	8	10
Illiterate	26	32.5
Primary school	14	17.5
Middle school	12	15
High school	8	10
Intermediate	4	5
Graduate	4	5
Not known	4	5
Total	80	100

Table 3: Distribution of vehicles

Vehicles involved	Number of pedestrian	Percentage
Motorized two wheelers		
Motorbike	20	25
Scooter	-	-
Three wheelers	-	-
Four or more wheelers-heavy	38	47.5
Four or more wheelers-light	22	27.5
Total	80	100

Table 4: Pattern of injuries

Nature of injury	Number	Percentage
Abrasion	44	23.2
Contusion	41	21.6
Laceration	50	26.3
Fracture	55	28.9
Total	190	100

Table 5: Distribution of impact injuries

Part of the body injured	Primary impact injuries		Secondary impact injuries		Secondary injuries	
	No.	%	No.	%	No.	%
Head and neck	2	3.3	21	27.6	23	23.4
Thorax	10	16.4	5	6.6	3	3.1
Abdomen	1	1.6	4	5.3	2	2.1
Back	3	4.9	2	2.6	15	15.3
Pelvis	9	14.7	7	9.2	6	6.1
Buttocks	7	11.5	2	2.6	9	9.2
Upper extremities	8	13.1	16	21.1	15	15.3
Lower extremities	21	34.5	19	25	25	25.5
Total	61	100	76	100	98	100

Table 6: Distribution of fatal injuries

Site of injury	Number	Percentage
Head injury	10	12.5
Thoracic injury	6	7.5
Abdominal injury	2	2.5
Head+thoracic injury	12	15
Head+abdominal injury	8	10
Head+thoracic+abdominal	12	15
Thoracic+abdominal	8	10
Pelvic and extremities injuries	22	27.5
Total	80	100

As a pedestrian

- Cross at marked crosswalks or traffic lights, not in the middle of the block or between parked cars
- Make sure drivers see before crossing
- Cross when traffic has come to a complete stop
- At traffic light, cross at the beginning of a green light. Do not cross once the "Don't Walk" signal begins to flash or once the light has turned to yellow. Never cross on a red light
- Watch for traffic turning at intersections or entering and leaving driveways
- Wear bright or light-colored clothing or reflective strips, when walking in dusk or darkness.

As a vehicle driver

- Be patient, especially with older pedestrians who need more time to cross the road
- Always look for pedestrians, especially when turning
- Remember, stay alert and slow down on residential streets and through school zones.

As a parent or caregiver

- Teach and reinforce the proper techniques for crossing the road safely with child
- Stress the importance of walking on the inside of the sidewalk, or where there are no sidewalks, as far away as possible from the travelled portion of the road.

CONCLUSION AND SUMMARY

Total of 80 victims of fatal pedestrian accidents were studied. The whole data was analyzed for pattern and distribution of injuries. Males constituted a large number of the victims of the carnage. Most of the victims were either illiterate or had education only up to schools level. Four or more wheelers, heavy vehicles, were involved in maximum number of accidents. Majority of the victims sustained fracture followed by laceration, abrasion, and contusion. Primary impact injuries and secondary injuries were noted mostly in lower extremities, whereas secondary impact injuries in head and neck. More than one-fourth of the deaths were due to involvement of pelvis and extremities injuries.

It may be concluded that there is urgent need to address the epidemic carnage on the roads. Road traffic deaths are to a great extent preventable. Traffic safety education should be given in schools for production of skilled and responsible drivers/road users in future. Moreover, the recommendations from the world report on road traffic injury prevention should be considered and promptly implemented. The single most important thing a person can do to stay healthy and alive is to pay close attention to the way he or she walks.

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